Small Farms Research News

USDA, ARS, SPA

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Farmer Participatory Research

Introductory Remarks

Background. In December of 1999, Agricultural Research Service/USDA, in its first step in formulating its Integrated Agricultural Systems National Program invited approximately 200 farmers and agricultural professionals to meet for three days to identify research objectives and priorities. The invitees represented a very strong advocate group for agriculture and special types of agriculture, like organic farming. Many of the attending farmers were active in agricultural and land use related organizations. To say it bluntly, this group was pro-active and had definite ideas what they wanted from a federal agricultural research agency. One message that was strongly voiced was that the invitees want to be more involved in publicly funded research programs, whether it be on-farm or on-station research.

Farmer participatory research can be a real challenge mentally and philosophically for research scientists. Research scientists will try their best to minimize variations in the research materials and standardize the research procedures to optimize the possibility of having a "successful experiment". For instance, researchers may compare the yields of varieties of a forage using plots measuring 3 feet by 3 feet on a relatively uniform soil and land area so that they can definitely say that Variety X yields 8% more than Variety Y. Although having varieties close together allows farmers to easily make comparison regarding plant growth habit, appearance, etc., many farmers are left wondering how well that variety will perform on a 40 acre block having several different soil types when they see such experiments. Both in farmer participatory research and large inter-disciplinary research projects, individual scientists frequently have to give up some of this control. Recently, the Center has embarked on a research project as part of a SARE grant entitled "Rotational grazing on land receiving manure applications ", in which runoff from different grazing regimes will be compared to that of haying. From the cattle management perspective, relatively large plots are desired. However, from the standpoint of collecting run-off data, the plots need to be of uniform slope and slope length. For the proposed research site, smaller plots will have to be constructed if meaningful runoff data are to be collected. In the end, a compromise on plot size and livestock management will be necessary to accommodate everyone's needs and expectations. Similar compromises will have to be made with farmer participatory research. Research protocol may have to be altered or not as rigidly implemented to accommodate the management needs and objective of the participating farmer.

Despite the fact that farmer participatory research frequently requires changes in the researcher's attitudes towards the experiment, its objectives, and procedures, scientists at the Center have greatly increased their involvement in participatory research to satisfy the desires and expectations of stakeholders. The objectives of this newsletter are to document: 1) our current efforts in participatory research; and 2) our impression of its advantages and challenges. The following articles summarizes some of our recent experiences and impressions.

Thoughts About On-Farm Research

On-farm research is nothing new to farmers. Every year farmers try something "new", for example a new forage variety or some other innovative technique that differs from the previous year hopefully to increase the profitability of the farm. Sometimes results are favorable while other times the new product/technique was not worth the added expense or labor. Furthermore, when results are favorable, the comparison between the old and new product may not have been valid. The new forage variety may have increased body condition of cows, but if only first-calf cows grazed the new variety this may not be a valid test of the forage for all ages of cows. Another thing to keep

in mind is favorable results for a year or two over a five-year period may not make the new and improved product economically feasible.

Researchers want to conduct on-farm research that generates scientifically sound conclusions allowing useful recommendations for the agriculture industry. So, how can research be conducted on the farm that makes a valid comparison and be practical for the farmer that is involved in the project? Planning, prior to initiation of the project, is key for the success of any research project. Ideally, the research project should have a single and simplified question. An example research project question might be: "Will weaned calves fed 6 pounds of corn per day gain more weight than calves fed only 3 pounds of corn per day?" Usually only a single year of data collection will not be enough to sufficiently answer this question. General conclusions and recommendations are more soundly based when trials are repeated in more than one location and more than one year. Consistency also is very important to the success of the planned project. Items often overlooked with on-farm research include proper identification of animals, use of the same livestock scale to weigh cattle, similar treatment times of animals, and in some cases, the same person collecting the data each sample time. Research projects are time consuming. Communication between the researcher and farm cooperator is necessary. Simply moving cows from one pasture to graze different forages during the middle of the experiment could jeopardize the entire project. Likewise, exchanging or selling animals during the research project will cause loss of substantial data that will weaken the dataset. A proper control, usually a group of animals that is not treated, is often lost with on-farm research. As researchers, we do realize that the farm enterprise must remain viable for the economic success of the involved farmer. A research project that includes substantial body weight loss of calves or non-pregnant cows may be better suited for research on the station instead of the farm.

On-farm research is valuable and applicable to the agricultural community, both to researchers and producers. If both the researcher and the farmer can compromise and understand each other's perspectives and interests, on-farm research can be a successful venture.

------ Michael L. Looper

Trials and Tribulations of On-Farm Research

"You need to conduct these experiments in the real world!" If only I had a dime for every time this advice has been given to an agricultural scientist. My technician and I have conducted a number of on-farm projects; from evaluating the grazing of pastured Rheas to studying the carcass traits of cattle entering the feedyard at the King Ranch. Following these experiences, I definitely see the merits of on-farm research but also understand that the success of this research will depend on the research objectives and the expected applicability or economic implications of research results.

There are definite benefits of using an actual production system to conduct an experiment. For one thing, the methods employed with this type of experiment will have to conform to the management imposed by the producer. A good example is an objective to evaluate some treatment of beef cattle (implantation, nutrient supplementation, de-worming, etc.). Treatments are imposed on different groups of cattle (for instance, implantation vs. no implantation), but other management practices will be set by the producer. This is clearly an example of doing research in the real world!

Environmental consequences of farming represent a pressing area of research that in many cases can ideally be done on farms where a given situation or problem exists, such as build-up of soil phosphorous from long-term applications of animal waste. Although environmental conditions can be artificially set, they likely will not completely duplicate true conditions. For example, excessive amounts of phosphorous can be applied to soils and mimic soil phosphorous levels that impose an environmental threat; however, other nutrients from animal waste also buildup in the soil that can interact with phosphorous and make it less accessible for uptake by plants. Also, it is not prudent to impose environmental conditions that can potentially contribute as a non-point source of elevated phosphorous in streams and waterways.

A major advantage of on-farm research is that producers will play a major role in the research and see first-hand the experimental results. This is particularly true when the producer and researcher are working together to address a problem of major interest to the farmer. Collaborations between researchers and producers can benefit both the participants and the research itself. Direct participation by producers will allow them to become more knowledgeable about the scientific aspects of the situation, which can ultimately improve their grasp of the problem. Researchers will benefit from the knowledge and experience of producers to better assess the economics and practicalities of any technologies that are developed. Lastly, producers can provide land and equipment, and researchers can provide field instrumentation, sampling equipment, and laboratory facilities that otherwise may not be available to a given project. On-farm experiments can also present certain disadvantages. Success of most experiments depends on a certain level of consistency or control. Agronomic studies require uniformity in soil type and fertility when studying such effects as fertilizer type or rate, planting date, etc.

Similarly, animal studies will often need uniformity in breed, gender, body condition, etc. Uniformity may therefore not be present at a particular farm and make it necessary to conduct the research at a facility where consistency and uniformity of the land and animal resources are maintained.

Logistics can also present a problem in the conduct of on-farm research. Many experiments require sample collections that are intensive and time consuming, which can cause problems if long distances must be traveled for data collection. A good "rule of thumb" is to develop experimental designs and plans according to distance between the researcher and the cooperating farm. Extremely long distances will require simple, low input types of experiments, but it is also crucial to decide if this type of experimentation will truly address the research needs of the producer and industry. If not, success of the research in meeting objectives might be better accomplished if done correctly at a research facility.

Simple advice can be given to researchers and producers to make sure the cooperative effort is fruitful. Researchers should : 1) establish research objectives that are of interest to the producer, 2) use experimental methods that are practical and can be adjusted for mistakes that often occur when there are logistical considerations, 3) stay away from evaluating treatments that may have adverse effects on production and 4) accurately communicate to the producer during the planning phase what is expected and needed in terms of resources. Producers, when approached by researchers to cooperate in a project, should: 1) make sure that the research results can benefit them, 2) be involved in the planning of the experiment, and 3) keep farm labor informed of the project and what is expected of them. On-farm research certainly has advantages over more controlled research conducted at research centers and universities, but will typically require more planning if these benefits are to be realized.

------ Glen E. Aiken

On-Farm Research To Date

Thinking about the topic of this newsletter led me to remember one of my first experiences in agricultural research. I worked for an agronomy professor as an undergraduate at the College of Agriculture, University of Delaware in the late 1970's. One of my first projects was on-farm research involving about 30 farms in Sussex County, Delaware. The objective of the study was to determine the yield response of irrigated corn to a mid-season application of boron.

Over the last five years I have been involved in several on-farm research projects. Two of these projects were surveys of conditions existing on producers' farms. In the summer of 1997, I visited almost 100 farms in the central Appalachian region to assess the relative abundance of forage legumes in hay fields and pastures, and gathered data to determine if there was a relationship between legume abundance and soil fertility levels. Results from this study, published in the Journal of Sustainable Agriculture this past year, indicated that forage legumes are not very abundant in most producers' hay fields and pastures; however soil fertility levels are adequate for forage legume growth. Therefore, some aspect of forage management other than soil fertility needs to be adjusted to increase the frequency of forage legumes in this region of the United States.

I have also been involved in a second survey type of on-farm research as part of our projects on eastern black walnut trees. Since the fall of 2001, Dr. Adrian Ares, a research forester currently at the Center, and I have visited numerous eastern black walnut farms to gather data regarding tree growth and nut production. Farmer's participation is fairly minimal in this survey type of research where the scientist is assessing existing conditions. That being said, I do not want to minimize my appreciation and satisfaction for the cooperation that these landowners have shown us over the past year. Without these landowners' involvement, we would be the losers. From the researcher's point of view, there are many positive attributes and outcomes that come from such studies: 1) a lot of data can be gathered quickly with a minimal investment of research dollars; 2) the probability for a successful outcome to the study is largely controlled by the scientist; and 3) producers can provide scientists with insights into their pressing concerns; particularly important for scientists in a new research area, as I am with respect to walnut production.

During the winter of 2001-2002, I embarked on a project to assess the growth of 4 varieties of eastern black walnut for nut production at 3 locations in north central Tennessee. In part, north central Tennessee was chosen because of the presence of a cooperator, Dr. Joshua Idassi, at Tennessee State University (TSU) located in Nashville. Two of the three locations are located on research farms, TSU's Cheatham County Research and Demonstration Farm, and University of Tennessee's Highland Rim Experiment Station located just south of Springfield. The third is on a private landowner's farm located just east of Clarksville, TN. There are interested cooperators at each of the 3 locations. However, I still have several concerns about each experiment: 1) Did we adequately evaluate the site prior to starting the experiment to ensure it met the minimum requirements for walnut production? ; 2) Is the management optimum for walnut production? ; 3) Is something unexpected occurring that will affect tree growth and go unnoticed? Most of these concerns stem from the fact that the sites are 500 miles away and because of the distance, weekly personal observations and management are not possible. The positive aspects

of such trials are: 1) they provide research and demonstrate opportunities to landowners beyond the Center's immediate community; and 2) they enhance the data base regarding the effects of environmental conditions on the productivity of walnut trees.

------ David K. Brauer

Sustainable Means of Controlling Parasites in Small Ruminants

Cooperative research is being conducted with Fort Valley State University of Georgia thanks to a two (2) year SARE grant that was awarded in April of this year. Sheep and goat producers believe that their ability to control internal parasites is decreasing and thus increase frequency of parasites is related to the resistance of the worms to available de-wormers. What options does that leave producers to save their animals from decreased productivity and death? The team of researchers is investigating biological control using a nematode trapping fungus combined with more appropriate use of de-wormer. Without development and implementation of novel, sustainable strategies to effectively control internal parasites, this problem will continue to grow and threaten viability of small ruminant production in the southern US and Virgin Islands.

The research team constructed by Dr. Thomas Terrill of Fort Valley State consists of scientists from Fort Valley State University, University of Georgia, Louisiana State University, University of Virgin Islands, and two ARS locations, Brooksville, Florida and Booneville, Arkansas. Multiple disciplines include parasitologists, agronomists, animals scientists, extension personnel, and farmers.

The team has conducted some on-farm research this summer surveying species of worms present on each of 10 farms from Arkansas, Georgia, Louisiana, Florida, and the Virgin Islands, and whether the worms are resistant to various de-wormers currently available. In addition, the group is validating a color eye chart developed in South Africa that predicts which animals are in critical need of anthelmintic treatment. *Haemonchus contortus*, more commonly known as the barber pole worm, resides in the stomach, and in large numbers, consume more blood than the animal can replace, leading to anemia. The color of the lower eyelid is compared to a color chart. A score that indicates an animal is anemic, suggests that animal should be treated. This strategy would only treat highly infected animals, eliminating or delaying treatment of more resistant animals. In addition, identification of parasite resistant animals and selection for this trait can lead to improved herds.

The barber pole worm is the most economically devastating, but there are other worms that can lead to morbidity, such as *Trichostrongylus* and *Ostertagia*. The eye chart specifically addresses the barber pole worm, but researchers are looking for a complete package that would control all problematic species of worms. There is evidence that tannins, a component of forages such as lespedeza, can reduce worm populations by as much as 50%, but this does not include the barber pole worm. Nematode-trapping fungus is a product being tested by the SARE project on university and on-farm trials. The fungus may reduce populations of worms on pasture when fed to animals. Once the fungus is passed in the feces, it traps the young worm, leading to its demise. Over time, parasite load on the pasture should be reduced. As a consequence of finding sustainable methods of controlling parasites, there will be a reduction in the residues of excreted anthelmintics in the environment, improved animal health, and reduced cost of de-worming.

There is an outreach focus of the project. The team will present smart drenching techniques to producer groups. In this area, DBSFRC is planning Sheep and Goat Day 2003 for September of next year. Scientists on the project will educate extension specialists and producers on project outcomes. Other topics will be presented at the field day as well. For more information on this project or the field day, contact Dr. Joan Burke.

------ Joan M. Burke

Farmer Participatory Research

An on-farm project was initiated at the request of a local farmer who wondered whether he could use sheep to control grass growth in his peach orchards, instead of mowing, without damaging the peach trees. The grower provided two, one-acre orchards that were nearly out of production. The ARS fenced the orchards and provided sheep for grazing. Use of older, unproductive orchards minimized economic risk to the grower if the sheep did indeed damage the trees. The study is in its second year, and is nearing completion. The study was productive from research and demonstration purposes. The sheep grazed continuously but did not damage peach trees in 2001. In 2002, however, sheep that were continuously grazed in one orchard caused substantial damage to trees, and some tree mortality, by chewing on the bark. Sheep that were rotationally grazed in the other orchard did not damage trees. The study demonstrated that sheep could be used for grass management in established peach orchards, but that trees may be more prone to damage under continuous vs. rotational grazing. Some data were included in a manuscript that has been submitted to a scientific journal.

Another local grower visited the station seeking information on how to produce muscadine grapes. The

grower was informed that the station had an unused plot of muscadine grapes that had been established by a former scientist. By formal agreement, the grower manages the grapes, harvests the crop, and provides the researcher with yield data. The test is primarily used to demonstrate muscadine production practices to interested, local growers. Both parties benefit from this arrangement through the utilization of a previously unutilized resource.

Christmas trees are produced on relatively few farms in AR, and there is no formal scientific study of tree genetics or production practices in AR. An on-station test was initiated by a scientist in collaboration with a local producer who was to provide guidance on tree management. Ten species and cultivars of Christmas trees were planted to compare their adaptability and growth under local conditions. The local producer later moved out of state. The scientist has networked with growers state-wide and become involved with the Arkansas Christmas Tree Growers Association. On-farm research of Christmas trees probably would be more practical than on-station testing because growers have specific equipment, management skills, and research needs.

------ David M. Burner

Future Newsletter Themes:

Winter 2002- Livestock research

Dale Bumpers Small Farms Research Center is a partnership among three institutions:

ARS- conducts research related to livestock production and agroforestry; ARS staff can be reached at 479-675-3834.

PMC/NRCS- evaluation of vegetation and vegetation technology to retain soil and its productive capability; NRCS staff can be reached at 479-675-5182.

Division of Agriculture / University of Arkansas- dissemination of agricultural information. Extension Specialist, Billy Moore, can be reached at 479-675-5585.

ARS scientists at DBSFRC and their primary research focus:

David Brauer- Agronomist/Research Leader investigating both agroforestry and livestock production

Glen Aiken- Agronomist investigating production practices for stockers

Adrian Ares- Forester working on tree growth and physiology in agroforestry systems

David Burner- Agronomist investigating crop production in agroforestry systems

Joan Burke- Animal Scientist investigating reproductive performance in cattle and production practices for hair sheep

Michael Looper - Animal Scientist investigating beef cattle production

Dan Pote- Soil Scientist investigating the effects of management practices on sediment and nutrient retention in agroforestry and livestock production systems.

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Organizations promoting agriculture in the Ozark Region

The information below is not an exhaustive list of organizations trying to help farmers and ranchers in the Ozarks. If your organization is interested in being included, please contact David Brauer.

Poultry Production and Product Safety Research Unit (PPPSRU)/ARS/USDA/Center of Excellence for Poultry Science is located on the campus of the University of Arkansas in Fayetteville. PPSRU conducts research to solve problems related to: 1) diseases and physiological disorders that are of economic important to the poultry industry; and 2) land application of waste from the poultry production. PPPSRU can be reached at 479-575-4202 or on the world wide web at www.uark.edu/~usdaars/.

South Central Agricultural Research laboratory (SCARL)/ARS/USDA conducts multi-disciplinary research for developing technologies to establish and sustain production and post harvest quality of alternative crops such as vegetables, small fruits, and kenaf. The Laboratory is co-located with the Oklahoma State University's Wes Watkins Research and Extension Center in Lane, OK. SCARL can be reached by phone at 580-889-7395 or on the world wide web at www.lane-ag.org.

Shirley Community Development Corporation (SCDC) is a community-based organization formed to plan and initiate short- and long-term development programs for Shirley, AR and the surrounding communities. These programs focus on economic

development, educational enhancement, youth job training, and service projects that improve and strengthen the community. SCDC is involved in projects that research and demonstrate the skills and techniques needed for production and marketing of specialty agricultural crops. The present focus is on log-grown Shiitake mushrooms. SCDC operates the Shiitake Mushroom Center as a training center. Recent additions include on-site production of garden bricks and stepping stones, raised bed herbal plots, twin wall polycarbonate greenhouse, and compost demonstration project. SCDC can be reached by phone at (501) 723-4443 or on the web at http://www.shiitakecenter.com/index.html.

The Kerr Center for Sustainable Agriculture in Poteau, OK offers leadership and educational programs to those interested in making farming and ranching environmentally friendly, socially equitable, and economically viable. The Kerr Center can be reached by phone at 918-647-9123, by email at mailbox@kerrcenter.com or on the web at www.kerrcenter.com.

ATTRA, Appropriate Technology Transfer for Rural Areas, is the national sustainable agriculture information center. ATTRA provides technical assistance to farmers, Extension agents, market gardeners, agricultural researchers, and other ag professionals. ATTRA is located in Fayetteville, AR. ATTRA staff members prefer to receive requests for information at 800-346-9140. ATTRA maintains a web site at www.attra.org

The Grassroots Grazing Group (GGG) is a network of livestock producers mainly from northwest Arkansas but includes producers from many other states including Virginia, Missouri, and Oklahoma. GGG maintains a electronic mailing list on which members routinely share information and opinions regarding various topics on forage management and livestock production. Members meet monthly, usually at a member's farm, to see and discuss information related to grazing practices. Individuals interested in joining the GGG should contact Ann Wells at annw@ncatark.uark.edu.

The Center for Advancement of American Black Walnut is a non-profit organization promoting the planting of an improved variety of eastern black walnut for nut production. For more information contact the Center's Director, Jim Jones, at P. O. Box 600, Stockton, MO 65785, 417-276-6010 (voice), 417-276-6011 (fax), or jonesctr@hotmail.com (e-mail).

Information regarding the ***Arkansas Cooperative Extension Service and the Division of Agriculture*** can be found on the internet at the following web site: www.uaex.edu.

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Attention

Are you interested in a person to speak at a meeting of your civic or agricultural group? If so, please contact David Brauer at 479-675-3834 to see if we can match your interests/needs to the expertise of the Center's staff.

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If you did not receive this newsletter by mail and would like to do so, please contact the Center and we will place you on our mailing list.

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Upcoming Events

- The Arkansas Cooperative Extension Service and Natural Resource Conservation Service are conducting **grazing school** at the **Dale Bumpers Small Farms Research Center** location. The school starts at 9:30 a.m. and adjourns at 3:00 p.m. Contact your local Extension agent for details.
  - October 24 - Planning for Improved Fall and Winter Pasture
- September 2003 - 2nd Sheep Field Day. Details to follow in the future

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